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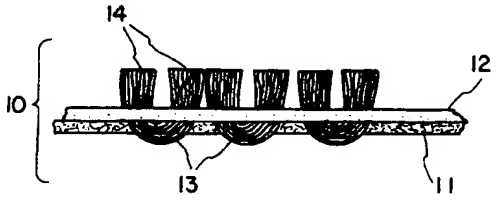
(54) A tufted fabric.

(57) A tufted fabric (10) made of a partially meltable primary backing (12) and tufts (14) tufted into the primary backing. The tufts are bonded to the backing by either entanglement or partially melting the backing (12) to bond the tufts and applying a secondary backing (11) by either fusion bonding or entanglement.

FIG. 1



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Background of the Invention

This invention relates to tufted fabrics. The invention is a tufted fabric wherein the tufts are bonded to a primary backing by entanglement or by bonding in the primary backing. In particular, this invention relates to a tufted fabric which may be recycled. The invention relates specifically to recyclable polyester tufted fabric but the same approach may be used with other types of polymeric based fibers including polyamides and polypropylene.

Brief Description of the Prior Art

Tufted fabrics, such as carpets and rugs, are made up of various components and different types of material. The components generally include a primary backing, secondary backing, latex adhesives and tuft material.

Tufted fabrics generally have a primary backing of natural or synthetic polymeric materials such as polypropylene in a woven or nonwoven fabric form. For example, broadloom carpets are normally produced by having a primary backing of woven slit film made from polypropylene into which there is inserted a plurality of tufts by a tufting machine. Tufts are inserted into the primary backing.

Tufts may be made from natural or synthetic fibers including wool, polyamides, polyester, polypropylene and acrylics or other fibers. These tufts forming the pile of the carpet, extend through the primary backing from a front or opposed side to a back side in the form of loops such that long loops on one side form the pile of the carpet and the short loops being located on the back side of the backing. Cut pile carpet is achieved by cutting the long loops on the face of the carpet.

A latex adhesive coating is then applied as a primary anchor coat to the back side of the primary backing in order to lock the tufts in the primary backing and provide rigidity. The necessity for an anchor coat such as latex results in a relatively heavy fabric which in some cases lacks optimum flexibility. Also the latex causes volatile organic emissions both in the plant and from the carpet. It has been a goal of the industry to remove latex adhesives due to various reasons including environmental concerns, processing and health concerns.

A polypropylene secondary backing is generally affixed to the back side of the primary backing by the latex adhesive. As can be seen from the foregoing tufted fabric construction, numerous different polymeric components are used including latex adhesive

It is well known in the industry that most carpet is disposed of in landfills, taking up considerable space thereof and wasting a valuable raw material. To eliminate the disposal of carpets in landfills requires the construction of carpets of recyclable materials in all parts of the carpet. One material used in carpets that is recyclable is thermoplastic polymer such as polyester. Recycling of polyester is well known and disclosed, for example, in U. S. Patent Nos. 3,305,495; 3,907,868; and 2,465,319.

Also, there remains the concern of eliminating the latex adhesive from the tufted fabric.

One approach to recyclable carpet would be to dissemble the carpet and recycle the individual materials. Due to the plurality of materials and the latex adhesive used in this approach to date, this is not feasible.

Another approach would be to make the entire tufted fabric without the latex adhesive or replacement by another adhesive layer. Tufted fabrics not using latex adhesive are disclosed in U. S. Patent Nos. 3,325,323 (Forkner) and 4,439,476 (Guild).

Forkner discloses a process for producing a tufted fabric such as a carpet by tufting fibers into a thermoplastic web and then fusing the web to bind the tufts. The web is described to be an impervious barrier to soil like a solid film-like construction. Also disclosed is tufted composite web wherein a blend of staple fibers and binder fabrics are deposited on a loose mat. The composite web is then fusion bonded and then the bonded web is tufted. The essence of Forkner is a tufted composite backing having a thermoplastic web on the tufted side thereof. The thermoplastic layer, after fusion, is in the form of a continuous surface which is not readily receptive to dyeing which gives rise to the problem of grinning. In addition, the thermoplastic layer, when applied to the backing, is secured thereto by thermal bonding to form the composite web.

Like Forkner, Guild discloses a process for producing a tufted fabric having a primary backing to which is applied a meltable fibrous layer to at least one side of the primary backing by needling the fibrous layer into the backing. The fibrous layer is needled to the primary backing. Pile tufts are inserted into the primary backing, followed by melting the fibrous layer to secure the tufts into the primary backing. In this construction, the primary backing may be polyester and the meltable fibrous layer may be a suitable low melt fiber.

The foregoing references have disclosed various methods to attach the tufts to the backing and various uses of polyester in carpet. However, no mention is made of recycling carpets.

It would be very advantageous to develop a tufted fabric having a single layered primary backing and tufts bonded thereto without added adhesives such as latex. Such a structure could be recycled, particularly in the case of polyester. An

object of the invention is to provide a tuft pile fabric that is completely recyclable.

Summary of the Invention

The invention provides a recyclable tufted fabric made of only one type of thermoplastic material. Included in the fabric is a meltable thermoplastic primary backing in which the tufts can be inserted. Also, the invention provides a tufted pile fabric comprising meltable fibrous thermoplastic primary backing containing a plurality of pile tufts inserted through the primary backing, and projecting on the opposite side as insertion in order to form the pile and said primary backing being partially melted in order to secure the tufts in the backing and provide an anchor coat for the fabric. The primary backing takes the place of the standard polypropylene primary backing and the latex adhesive. This approach could be used with any thermoplastic material that is recyclable, i.e., it could be used to make a recyclable nylon or polypropylene as well as polyester as long as all the polymer in the carpet is the same type.

Brief Description of the Drawing

In the drawing which forms a portion of the original disclosure of the invention, Figure 1 is a diagramic cross-section of a fabric produced in accordance with the preferred embodiment of the present invention.

Detailed Description of the Preferred Embodiment

In the following detailed description, there is described a preferred embodiment of the invention for an all polyester recyclable carpet. It will be recognized that although specific terms may be used in describing the preferred embodiment, these are used in the descriptive sense and are not generic, and are used for the purposes of description and not of limitation. The invention is capable of numerous changes and variations within the spirit and scope of the teachings herein as will be apparent to one skilled in the art.

The present invention is a tufted fabric having a fibrous primary backing layer, a plurality of fibrous tufts each made of a bundle of yarns forming a pile layer on the face side of the primary backing layer and extending through the backside of the primary backing layer to form a plurality of loops, wherein the loops are anchored to the primary backing layer either through entanglement or through heating the primary backing layer to cause fusion of the loops to the back of the primary backing layer.

A fibrous secondary backing may be attached to the backside of the primary backing layer by either entanglement of the secondary backing layer with the primary backing layer or fusion bonding between the primary and secondary backings. The fibrous primary backing layer and the fibrous secondary backing layer may be nonwovens such as spunbond.

The fibers contained in the fibrous primary backing layer and the tufts as well as the fibrous secondary backing layer may be selected from a group consisting of polyamide fibers, polyester and polypropylene. The tufted fabric may consist of one type of fibers such as polyester or may consist of different fibers such as nylon or polypropylene tufts, a polyester primary backing and a polyester secondary backing. Preferably, the tufted fabric would consist of all polyester fibers, in particular, polyethylene terephthalate fibers. Furthermore, the polyester may include a phosphorous containing units to provide flame retardency.

Furthermore, the tufted fabric of the present invention may be dyed a uniform color after the tufted fabric has been assembled. This would mean that each of the components, the primary backing, second backing and tufts are dyed one color.

The present invention also discloses a process for making the tufted fabric comprising the steps of providing a fibrous primary backing, inserting into the fibrous primary backing a plurality of fibers tufts and affixing the tufts to the primary backing through entanglement or fusion of binder fiber contained in the primary backing layer. The process may also include the step of having a fibrous secondary backing layer which is attached to the primary backing layer either through entanglement or by heat fusion. Types of entanglement that can be used in the present invention include mechanical needling and hydraulic needling.

Fig. 1 illustrates a recyclable thermoplastic tufted fabric in the form of a carpet 10 of the present invention having a polyester primary backing 12 containing a percentage of low melt fiber, and tufts 14 inserted therethrough. In particular, the carpet 10 is an all polyester carpet containing polyester tufts 14 and a polyester thermoplastic primary backing 12 containing low melt binder fiber. The carpet has a total weight of between about 20 and about 120 ounces per square yard preferably from 30 - 80 ounces per square yard. Pile weight is normally 10 to 100 ozs/yd^2.

In the preferred embodiment, the polyester primary backing 12 is a balanced use of compatible polyester fibers including binder fibers with normal polyester fiber that is capable of being bonded thereby upon activation by heat treatment of the binder fiber. In particular, the primary backing 12 is

made from the blend of 5% to 95% by weight of polyester fiber having 95% to 5% by weight of crimped lower melting heterofil or homofil polyester binder fiber imparting advantageous properties to bonded batts or fabrics for the primary backing 12.

The preferred polyester for the comparable polyester fiber is poly(ethylene terephthalate) PET, which is available commercially at relatively low cost. The denier of the polyester fiber will generally be from about 1 to about 21 dpf. In order to obtain the desired carpet properties it is preferred that the polyester fibers are crimped. Crimp levels from 3 to 18 crimps per inch (CPI) are suitable with 6 to 12 cpi being preferred. The crimped filaments can be cut to the desired length of the fibers 2.5 to 25 centimeters preferably about 7.6 centimeters.

The fibers primary backing is normally 4 to 18 ozs./yd^2 nonwoven, preferably 4 to 6 ozs./yd^2. The primary backing is needled on one or both sides with a total of typically 200 - 2000 penetrations per square inch (PPSI). A wide variety of needle types and stroke rates may be used to produce a fabric of proper strength and uniformity.

The primary backing may also be continuous filament of the type made by spunbond process providing it has the necessary composition of normal and low melting point binder fibers to achieve the required fabric properties.

The binder fibers for the polyester embodiment are prepared from polyester polymer which has a lower melting point than the polyester polymer from which the non-binder fibers are made. A preferred binder fiber is composed of polyethylene terephthalate/isophthalate copolymer having a isophthalate/terephthalate mol ratio of about 20% to 40% which has melting temperatures of about 110 • C to 200 • C.

During heat setting, the binder fiber melts and bonds the matrix polyester fiber at the cross points, so that the bonded meltable fibrous material retains the desired configuration and rigidity. When staple fibers are used the binder is in a crimped form and can be processed on conventional textile machinery to be distributed throughout the blend. It is desirable, but not essential, that the denier and cut length of the binder fiber be similar to the denier and cut length of the compatible polyester homofill so that the binder fiber can be distributed throughout the blend by conventional textile processing. It is generally preferred but not required, to process binder fiber of substantially the same denier as that of the compatible polyester staple fiber. Further satisfactory results can be obtained by using binder fiber of a different denier.

The amount of the binder fiber is from about 5% to about 95% of the blend, preferably from about 15% to about 30% of the blend. As the proportion of the binder fiber in the blend is increased, the resulting heat bonded backing will generally have greater rigidity. The amount of bonding will depend most importantly on whether binder is available to bond the polyester fiber at the crossover point, and the statistical probability of this increases with an increase in the amount of binder.

The denier of the binder fiber can also be less than that of the compatible polyester fiber. The denier may range from below 1 up to about 20, with deniers of 6 to 15 being preferred.

For example, the binder fiber may be a homofil or a bicomponent fiber, e.g., a sheath core fiber, the sheath of which comprises the lower melting binder polymer as suggested in Stanistreet, U. S. Patent No. 4,068,036. In such circumstances, it is desirable to use sufficient bicomponent fiber so that the amount of the binder polymer is from about 20% to about 95% of the total weight of the binder fiber in the compatible polyester fiber.

Sufficient strength and dimensional stability for acceptable tufting and dyeing performance may be imparted to the primary backing 12 by proper needling during manufacture. However, if greater strength is desired, the structure may be a stitch bonded fabric.

Tufts used in the present embodiment may be made of any suitable recyclable polyester. The polyethylene terephthalate (PET) may include up to 50% of a comonomer such as polyethylene glycol (PEG), diethylene glycol, adipic acid, isophthalic acid and modifiers normally used to provide cationic or carrierless dyeability to the PET. The tufts can also be made from a blend of various PET or polyester fibers having different shrinkages, as disclosed in U.S. Patent 5,102,713.

The bonding of the tuft into the primary backing may be enhanced by attaching a secondary backing 11 of polyester fiber after tufting but prior to dyeing of the carpet. The secondary backing applied to the back of the carpet further mechanically bonds the tufts in place but also serves as secondary backing to improve the appearance of the carpet. The secondary backing may be of sufficient weight to replace the carpet underpad. If used as an underpad, it should be applied after dyeing.

The secondary backing is a non-woven fabric normally 2 to 40 ozs/yd^2 made from staple polyester fiber. In particular, it may be a blend of binder polyester fibers and staple polyester fibers.

The secondary backing is then attached to the backside of the primary backing and may be attached by different processes. One process in particular is that which is preferred in this embodiment is the secondary backing being needled onto the backside of primary backing.

Upon complete assemblage of the carpet, the carpet may be further processed, including dyeing and heat treating.

The carpet is produced from the foregoing components by tufting the tufted fibers 14 into the primary backing 12 in a normal manner as completed on a tufting machine. Then the secondary backing of 2 to 40 ozs/yd^2 non-woven fabric is needled onto the backside of the primary backing. Then the construction is dyed in the normal manner and then heat set under tension in a tenter frame in hot air of from 110°C to 200°C. Other forms of heat setting may be used such as hot rolls, infrared or any other method to heat the composite in a sufficient manner.

The present embodiment may be used to make residential, contract, automotive and rug carpets of all standard constructions including cut pile, loop pile, saxony, textured, and from virtually any type of carpet fiber including BCF.

The carpet as disclosed herein may be recycled in various methods well known in the art. In particular, polyester carpet may be recycled by methods including, but not limited to 1) grinding, pelletizing, drying and extruding the pellets into polyester fiber; 2) regenerating the polyester by grinding glycolysis and batch polymerization; and 3) grinding, glycolysis and methanolysis to break the monomer down into primary DMT and glycol, the base raw materials which can then be reused to make polyester. It will be apparent to those in the art areas that this specific recycling process is determined by the type of polymer used.

The following Examples illustrate the preparation of a recyclable tufted carpet made from polyester, as well as recycling of such a carpet.

EXAMPLE 1

Two samples of the carpet were prepared, each made having a polyester primary backing, and a plurality of polyester tufts.

The primary backing was made including a blend of polyester matrix fibers and binder fibers. The polyester matrix fibers used in the two samples was T-295 polyester fibers commercially available from Hoechst Celanese Corporation and the binder fibers used in the two samples was K-54 polyester heterofil fibers commercially available from Hoechst Celanese Corporation. The fibers were blended together on standard blending equipment. Carpet Sample A included a primary backing made from a blend of 65% T-295 fibers and 35% binder fiber and Carpet B included a primary backing made from a 50/50 blend of fiberfill and binder fibers.

The blended fibers were carded into a web, and a batting was prepared by crosslapping the webs on standard crosslapping laps. The batt was about 6 inches thick made up of about 10. The batting was then needle punched to entangle the blended fibers and to reduce the batting to the primary backing having a thickness of about 0.10 inches. The weight of the primary backing was about 14 oz./sq. yard.

The tufts were prepared from a blend of low shrinkage and high shrinkage copolyester fibers as disclosed in U.S. Patent No. 5,102,713 which is incorporated by reference. In particular the copolyester is a copolymer of poly(ethylene terephthalate) and polyethylene glycol. The low shrinkage copolyester fiber is produced to have a shrinkage of less than 1 percent and the high shrinkage copolyester fiber has a shrinkage of about 8 percent boiling water shrinkage. The denier of the fibers is 15 dpf, the cut length 7-1/2 inches. The crimp frequency for the low shrinkage fibers was 10-1/2 per inch and for the high shrinkage fibers, 9-1/2 per inch. The fibers were blended together and formed into yarn for tufting by standard equipment. The tufting yarns were heat set in a conventional manner.

The two carpet samples were prepared by inserting the tufts into the polyester primary backing on standard tufting equipment and heating the construction to 160°C to heat set the tufts in the primary backing. A 4 oz./yd^2 secondary backing consisting of 30% heterofil T-254 fiber (commercially available from Hoechst Celanese Corporation) and 70% black fiber was needled onto the primary backing to further reinforce the tuft anchorage and provide a pleasing appearance. The two carpet samples were dyed blue using conventional dyeing equipment.

EXAMPLE 2

One all-polyester carpet sample was recycled by the following steps:

1) It was cut into small pieces.

2) 100 parts of the carpet, plus 21 parts of glycolysized PET from bottle flake and 71 parts of fresh ethylene glycol were heated with stirring, to about 215°C in a glass reactor.

3) After a suitable time the carpet had dissolved in the solution (glycolysis product was blue due to the presence of the carpet dye).

4) The glycolysis product was added slowly to a mixture of 350 parts of methanol and 0.8 parts of sodium methoxide. This mixture was at 60°C prior to the addition of the glycolysis product.

5) Crystals of dimethyl terephthalate formed in the reactor rapidly.

6) The crystals were removed from the glass reactor and the mother liquor removed by filtration. The blue color was washed away from the

DMT crystals. The foregoing indicates that the carpet can be recycled without any additional steps.

Numerous advantages have been found with the present invention. The embodiment of the present invention using all polyester in the tufted fabric provides a recyclable tufted fabric, especially carpet or rug, that can be easily recycled through any of the known forms of recycling of polyester. Also the elimination of the latex adhesives eliminates much of the volatile organic emissions that develop with the use of latex. Furthermore, the tufted fabric of the present invention is very economical with the use of 100 percent PET and is compatible with the existing carpet making equipment. It has also been found that the tufted fabric of the present invention is easy to install as carpet. It is lighter than standard carpet, stretches well, seems well and is easy to trim. Furthermore, because of the all dyeing capability of the all polyester embodiment of the present invention grin through is eliminated. Furthermore, the all polyester embodiment better absorbs and disperses liquids such as cleaning fluids, disinfectants, etc., making the carpet easier to clean. Furthermore, the elimination of a coarse secondary backing makes for a softer carpet to walk on and less abrasive to the tufts. It has also been found that the tufted fabric of the present invention including the secondary backing has higher delamination strength. In particular, the primary and secondary backings appear as one unit. The delamination performance is unaffected by household chemicals, moisture, time, pet urine, etc.

The invention has been described into considerable detail with reference to its preferred embodiments. However, variations and modifications can be made within this period and scope of this invention as described in the foregoing specification and defined in the appended claims.

Claims

1. A tufted fabric comprising:

   a fibrous primary backing layer having opposed face and back sides;

   a plurality of fibrous tufts each made from a bundle of fibers said plurality of tufts forming a pile layer on the face side of the primary backing layer and extending through the primary backing layer to form a plurality of loops on the back side of the primary backing layer for anchoring the pile layer into the primary backing layer; and

   possessing an enhanced anchoring of the loops within the primary backing layer by an entanglement of at least a portion of the fibers in the fibrous loops with at least a portion of the fibers in the fibrous primary backing layer.

2. A tufted fabric according to claim 1 comprising additionally

   a fibrous secondary backing layer on the back side of the primary backing layer, the secondary backing layer covering the loops formed by the fibrous tufts on the primary backing layer said fibrous secondary backing layer being joined to the primary backing layer by entangling together at least a portion of the fibers in the secondary backing layer with at least a portion of the fibers in the fibrous primary backing layer and in the fibrous loops.

3. A tufted fabric according to claim 2 wherein the fibrous primary backing layer, the plurality of fibrous tufts and the fibrous secondary backing layer consisting essentially of polyester fibers.

4. A tufted fabric according to claim 2 wherein the fibrous primary backing layer is entangled by needling.

5. A tufted fabric comprising:

   a single layered fibrous primary backing layer having opposed face and back sides and comprising at least 5 % by weight of binder fibers in the form of homofilaments or of heterofilaments or of a combination of homofilaments and of heterofilaments and comprising optionally up to 95 % by weight of non-binder fibers said non-binder fibers having a melting point higher than at least a binding polymeric component of the binder fibers;

   a plurality of fibrous tufts each made from a bundle of fibers said plurality of tufts forming a pile layer on the face side of the primary backing layer and extending through the primary backing layer to form a plurality of loops on the back side of the primary backing layer for anchoring the pile layer into the primary backing layer; and

   possessing an enhanced anchoring of the loops within the primary backing layer by heating the binder fibers in the primary backing layer to cause the binding polymeric component of the binder fibers to soften or to melt forming a pervious primary backing and to enhance the anchoring of said fibrous tufts within said primary backing layer on cooling.

6. A tufted fabric according to claim 5 comprising additionally

   a fibrous secondary backing layer on the back side of the primary backing layer, the secondary backing layer covering the loops

formed by the fibrous tufts on the primary backing layer, said fibrous secondary backing layer being joined to the primary backing layer by heating the binder fibers in the primary backing layer to cause the binding polymeric component of the binder fibers to soften or to melt and to join the secondary backing layer to the primary backing layer on cooling.

7. A tufted fabric according to claim 6 wherein the fibrous primary backing layer, the plurality of fibrous tufts and the fibrous secondary backing layer consisting essentially of polyester fibers.

8. A tufted fabric according to claim 6 wherein the fibrous primary backing layer is entangled by needling.

9. A tufted fabric according to claim 6 wherein the binder fiber is in the form of homofilaments and essentially consists of a copolyester having recurring structural units derived from terephthalic acid and from isophthalic acid or from their polyester forming derivatives and from ethylene glycol or essentially consists of a polyester having recurring units derived from terephthalic acid or from a polyester forming derivative thereof and from butylene glycol and wherein the non-binder fiber is a homofilament consisting essentially of polyethylene terephthalate.

10. A tufted fabric comprising:

a fibrous primary backing layer having opposed face and back sides and comprising at least 5 % by weight of binder fibers in the form of homofilaments or of heterofilaments or of a combination of homofilaments and of heterofilaments and comprising optionally up to 95 % by weight of non-binder fibers said non-binder fibers having a melting point higher than at least a binding polymeric component of the binder fibers; a plurality of fibrous tufts each made from a bundle of fibers said plurality of tufts forming a pile layer on the face side of the primary backing layer and extending through the primary backing layer to form a plurality of loops on the back side of the primary backing layer for anchoring the pile layer into the primary backing layer; and

possessing an enhanced anchoring of the loops within the primary backing layer by an entanglement of at least a portion of the fibers in the fibrous loops with at least a portion of the fibers in the fibrous primary backing layer and by heating the binder fibers in the primary backing layer to cause the binding polymeric component of the binder fibers to soften or to melt and to enhance the anchoring of said fibrous tufts within said primary backing layer on cooling.

11. A tufted fabric according to claim 10 comprising additionally

a fibrous secondary backing layer on the back side of the primary backing layer the secondary backing layer covering the loops formed by the fibrous tufts on the primary backing layer said fibrous secondary backing layer being joined to the primary backing layer by entangling together at least a portion of the fibers in the secondary backing layer with at least a portion of the fibers in the fibrous primary backing layer and in the fibrous loops.

12. A tufted fabric according to claim 10 wherein the fibrous primary backing layer and the plurality of fibrous tufts consisting essentially of polyester fibers.

13. A tufted fabric according to claim 11 wherein the fibrous primary backing layer is needled.

14. A tufted fabric according to claim 11 wherein the binding polymeric component of the binder fibers essentially consists of a copolyester having recurring structural units derived from terephthalic acid and from isophthalic acid or from their polyester forming derivatives and from ethylene glycol or wherein the binding polymeric component of the binder fibers essentially consists of a polyesters having recurring units derived from terephthalic acid or from a polyester forming derivative thereof and from butylene glycol.

15. A process for the formation of a tufted fabric comprising the steps of:

providing a fibrous primary backing layer having opposed face and back sides;

inserting into said fibrous primary backing layer a plurality of fibrous tufts with a tufting means said fibrous tufts forming a pile layer on the face side of the primary backing layer and extending through the primary backing layer to form a plurality of loops on the back side of the primary backing layer; and

entangling at least a portion of the fibers in the fibrous loops with at least a portion of the fibers in the fibrous primary backing layer with an entangling means in order to obtain an enhanced anchoring of the loops within the primary backing layer.

16. A process for the formation of a tufted fabric comprising the steps of:

providing a fibrous primary backing layer having opposed face and back sides and comprising at least 5 % by weight of binder fibers in the form of homofilaments or of heterofilaments or of a combination of homofilaments and of heterofilaments and comprising optionally up to 95 % by weight of non-binder fibers said non-binder fibers having a melting point higher than at least a binding polymeric component of the binder fibers;

inserting into said fibrous primary backing layer a plurality of fibrous tufts with a tufting means said fibrous tufts forming a pile layer on the face side of the primary backing layer and extending through the primary backing layer to form a plurality of loops on the back side of the primary backing layer for anchoring the pile layer into the primary backing layer said fibrous tufts having a higher melting point than the binding polymeric component of the binder fibers; and

heating the binder fibers in the primary backing layer to cause the binding polymeric component of the binder fibers to soften or to melt and to enhance the anchoring of said fibrous tufts within said primary backing layer on cooling.

17. A process for the formation of a tufted fabric comprising the steps of:

providing a fibrous primary backing layer having opposed face and back sides and comprising at least 5 % by weight of binder fibers in the form of homofilaments or of heterofilaments or of a combination of homofilaments and of heterofilaments and comprising optionally up to 95 % by weight of non-binder fibers said non-binder fibers having a melting point higher than at least a binding polymeric component of the binder fibers;

inserting into said fibrous primary backing layer a plurality of fibrous tufts with a tufting means said fibrous tufts forming a pile layer on the face side of the primary backing layer and extending through the primary backing layer to form a plurality of loops on the back side of the primary backing layer for anchoring the pile layer into the primary backing layer said fibrous tufts having a higher melting point than the binding polymeric component of the binder fibers; and

entangling at least a portion of the fibers in the fibrous loops with at least a portion of the fibers in the fibrous primary backing layer with an entangling means in order to obtain an enhanced anchoring of the loops within the primary backing layer and then heating the binder fibers in the primary backing layer to cause the binding polymeric component of the binder fibers to soften or to melt and to enhance the anchoring of said fibrous tufts within said primary backing layer on cooling.

18. A process for the formation of a tufted fabric according to claim 15 comprising additionally the step:

providing a fibrous secondary backing layer on the back side of the primary backing layer the secondary backing layer covering the loops formed by the fibrous tufts on the primary backing layer and joining said fibrous secondary backing layer to said primary backing layer together by entangling at least a portion of the fibers in the secondary backing layer with at least a portion of the fibers in the fibrous primary backing layer and in the fibrous loops with an entangling means.

19. A process for the formation of a tufted fabric according to claim 16 comprising additionally the step:

providing a fibrous secondary backing layer on the back side of the primary backing layer the secondary backing layer covering the loops formed by the fibrous tufts on the primary backing layer and joining said fibrous secondary backing layer to said primary backing layer together by heating the binder fibers in the primary backing layer to cause the binding polymeric component of the binder fibers to soften or to melt and to join the secondary backing layer to the primary backing layer on cooling.

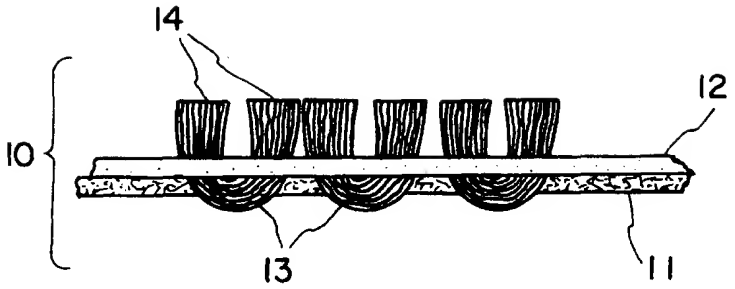
20. A process for the formation of a tufted fabric according to claim 17 comprising additionally the step:

providing a fibrous secondary backing layer on the back side of the primary backing layer the secondary backing layer covering the loops formed by the fibrous tufts on the primary backing layer and joining said fibrous secondary backing layer to said primary backing layer together by heating the binder fibers in the primary backing layer to cause the binding polymeric component of the binder fibers to soften or to melt and to join the secondary backing layer to the primary backing layer on cooling.

21. A process according to claims 18, 19 and 20 wherein the fibrous primary backing layer, the fibrous tufts and the fibrous secondary backing layer consisting essentially of polyester fibers.

22. A tufted fabric according to claims 18, 19 and 20 comprising as an additional step a treatment of the fabric obtained with a dyeing means in order to result in a dyed fibrous primary backing layer, in a dyed secondary backing layer and in dyed fibrous tufts.

FIG. 1



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 10 6882

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,X	US-A-3 325 323 (J.H. FORKNER) * column 3, line 31 - column 6, line 22; figures 1,5 *	1,5,10, 15,16,17	D05C17/02 D04H1/46 D04H1/54
X	GB-A-975 491 (SOCIÉTÉ RHOVYL) * page 1, line 50 - page 2, line 101 *	1-4,15, 18-21	
D,X	US-A-4 439 476 (G.A. GUILD) * claims *	1,5-8	
A	DE-A-1 685 159 (WEBEREI SCHNEIDER KG) * claim 4 *	1,3	
A	EP-A-0 455 990 (HOECHST AKTIENGESELLSCHAFT)		
A	US-A-3 476 636 (D.W. CROSBY)		
A	FR-A-1 253 594 (BIGELOW-SANFORD CARPET CY, INC.)		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	FR-A-1 484 805 (SOCIÉTÉ RHODIACETA)		D05C D04H
A	US-A-3 605 666 (R. KIMMEL; R.G. ROWAN;A.R. HILD)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 AUGUST 1993	D HULSTER E.W.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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